Description

Device for the evaporation of volatile substances, in particular of aromatics and/or insecticides

This invention relates to a device for the evaporation of volatile substances, in particular of aromatics and/or insecticides, in accordance with the precharacterizing clause of Claim 1.

Devices for the evaporation of volatile substances are generally known. Thus, e.g. evaporation devices are known wherein a receptacle containing a volatile substance is inserted into a housing. This receptacle has a wick which conveys the substance to be evaporated from the receptacle by means of the capillary effect and which is there given off into the surroundings. To increase the rate of volatilization by evaporation, it is further known to arrange the end of the wick protruding from the receptacle, adjacent to a heating element, e.g. a ceramic heater. Thereby, the substance conveyed upward via the wick will be volatized even faster by means of evaporation due to the heat radiated by the heating element and can escape through ventilation slots in the housing into the environment. A constant amount of the corresponding substance is here released into the environment.

One problem which can occur in particular with the evaporation of aromatics is that with the persons being in a room, a so-called habituation effect can occur relatively fast, i.e. the persons no longer notice the aromatic as such. To prevent this habituation effect, it is desirable to periodically volatize for a short period a different aromatic either additionally or also alone so as to generate a different perception of scent which will prevent a habituation. This should be fast and effectively possible – especially with larger rooms as well – which is not the case, for example, with the known devices from WO 01/05442 A1.

An additional problem which can occur in particular with the evaporation of insecticides is that – for some types of insects, e.g. flies – a relatively high concentration of the corresponding insecticide will be required to achieve the

desired effect. With the above-mentioned conventional evaporation devices, such relatively high concentrations can only be achieved through continuous insecticide evaporation over a relatively long period of time. However, precisely such prolonged evaporation is undesirable for various reasons.

It is the object of this invention to create a device for the evaporation of volatile substances with several receiving chambers separated from each other for volatile substances which enables – especially for a fast prevention of habituation effects or, respectively, for a fast concentration increase when changing over to specific aromatics and/or insecticides – a particularly fast and effective evaporation of the volatile substances for the most varied purposes of application.

This object is achieved by means of the features of Claim 1.

The device according to the invention can advantageously achieve that, for example, with a fan and/or ventilator equipment switched on either manually or via a timer equipment, the flow of evaporated substance escaping from the housing will be increased compared with the flow when the fan and/or the ventilator equipment is not switched on which, in particular, will result in a faster and better distribution of e.g. aromatics and/or insecticides into the environment. By means of the control equipment, the fan and/or ventilator equipment can be controlled such that e.g. especially at the beginning of the evaporation of a desired substance or, respectively, after switching on or over to the evaporation of different substances by means of the fan and/or ventilator equipment, such an air stream will be generated which will enable a faster and more effective distribution of evaporated substances into the environment. Thus, e.g. with the evaporation of aromatics or, respectively, perfumes, it can be very fast and effectively realized – when switching on or over to another aromatic – that a desirable different scent perception will be generated in the room for a prevention of the habituation effect. It can also be provided, for example, that in one of the receiving chambers, an insecticide will be received, and in another receiving chamber, an aromatic will be received so as to achieve – e.g. in combination with a correspondingly manual, advantageously timer-controlled activation by means of the control equipment – that, for example, during the day only the aromatic will be evaporated whereas at night only the insecticide will be evaporated. By switching on the fan and/or the ventilator arrangement – e.g. manually or timer-controlled – a fast change-over to the other condition can be achieved in the simplest manner. Alternatively, at specifically defined times, the simultaneous evaporation of aromatic and insecticide can also occur, especially

when the insecticide as such would have a scent which is considered unpleasant. Also, when now switching over from the evaporation of one insecticide to the evaporation of another insecticide which is required at a high concentration, the required high concentration can be made available very fast due to the specific switching on of the fan and/or ventilator equipment, e.g. comparable in efficiency with the burst of spray from a spray can.

Here, the control equipment can possibly also be designed as a regulating equipment by which – e.g. in combination with a corresponding sensor system – a specific, desired concentration of the aromatic and/or the insecticide can also be regulated.

The device according to the invention thus creates the possibility to provide, adjusted to the different evaporation situations, a very fast and effective evaporation of the individual substances, i.e. individually, combined, and also especially as a function of specific time intervals – in combination with an evaporation device having several, independent receiving chambers for volatile substances to be evaporated, by means of a fan and/or ventilator equipment which can be individually or, respectively, specifically switched on for the various cases of application.

According to Claim 2, it is especially advantageous that the fan and/or ventilator equipment has at least one ventilator by means of which a well-targeted ventilator air stream can be generated in a simple manner and which, in the way of a carrier gas, will entrain the evaporated substance away from a near wick-end evaporation area and will convey it to at least one air outlet area or, respectively, to ventilation slots provided on the housing. Such a structure with a ventilator is especially easy and economical to make.

According to Claim 3, a structure is especially advantageous in which several ventilators are provided, with each evaporation area or, respectively, every end of the wick being assigned one ventilator such that, in switched-on condition, the ventilator will apply a well-targeted ventilator air stream to the accordingly assigned evaporation area or the accordingly assigned wick end, respectively. Thus, a particularly well-targeted evaporation of the respectively desired substance or substances, respectively will be possible, since according to a desired evaporation situation the ventilator or, respectively, the ventilators can be switched on well-targeted such that e.g. at the beginning but also in the middle of an evaporation

process, a well-targeted air stream can be applied to one selected wick end area or also, respectively, to several selected wick end areas.

In accordance with another concrete embodiment according to Claim 4, it must here be noted that the air stream is to be directed as far as possible in such a way that it does not impinge upon the heater arrangement so as not to cool it off. Accordingly, the air stream – at a distance from the heater arrangement – advantageously impinges upon the evaporated substance in the near wick-end evaporation area, and/or upon a wick-end area of the wick-end protruding from the heater arrangement.

In accordance with another concrete embodiment, it can be provided – especially for avoiding a blower stream to the heater arrangement according to Claim 5 – that the ventilators are capsulated to incorporate them in a separate ventilator/housing partial area. Especially with several ventilators, it may be advantageous that every ventilator is separately capsulated to enable, in a simple manner, a well-targeted air stream in the direction of the assigned evaporation area or, respectively, to the assigned wick end.

To achieve high air stream velocities, it may be provided in accordance with another preferred embodiment according to Claim 6 that a ventilator air stream passage opening of the at least one ventilator housing partial area provides the flow connection to the near wick-end evaporation area and is designed as a nozzle-like tapered area.

It is principally possible – as claimed with Claim 23 – to arrange the heater arrangement in the housing of the evaporator device such – preferably in a capsulated ventilator/housing partial area – that it does not apply heat to the wick end but instead that the air stream produced by the ventilator will be heated so that a hot air stream will then impinge upon the wick end which is soaked with the substance to be evaporated. Here, a principle is concerned which – as will also be explicitly claimed – can also basically be used in those evaporation devices in which merely one single receptacle with a single receiving chamber will be used for a single substance to be evaporated. Also, such a heater arrangement can also be provided for wick heating, in addition to a heater arrangement. Even a combined double function heater arrangement is conceivable for heating not only the wick but also the air stream.

In accordance with a preferred embodiment, different heater arrangements are claimed with any one of the Claims 7 to 13, where the heater arrangement is once formed by a single heating block on which several separate heating block areas are formed. Alternatively, however, the heater arrangement can also be formed by individual heaters being placed at a distance from each other. The individual heaters or, respectively, the heating block areas are either thermally insulated by their distance to each other or by corresponding measures, such as e.g. air gaps, so that they will mutually affect each other as little as possible and can also be heated separately from the other heaters or, respectively, the heating block areas – by controlling the corresponding heater or, respectively, the corresponding heating block area by means of the control equipment. Each of these heating block areas or heaters, respectively, have a wick recess into which the corresponding wick end of an assigned wick will protrude, with also adjacent to the wick recesses on the heater or, respectively, in the heating block areas, electrical heating elements being provided which are controllable by means of the control equipment. These electrical heating elements are preferably electrical resistance elements, e.g. PTC resistance elements or also sheet resistances which are cut in or ground in accordingly coordinated to a substance to be evaporated, such as already known from EP 1 195 169 A1 for example.

According to Claim 14, the control equipment can have a programmable microprocessor, especially with a timer equipment, which is programmable such that the desired evaporation situations can simply be programmed such that at specific definable times, specific evaporation processes will take place for a definable period of time. Such a microprocessor is advantageously integrated into the housing, with programming also possibly being done from outside of the housing, if applicable.

In accordance with an alternative embodiment to this, any one of the Claims 15 to 18 provide for the control equipment having a manual switch arrangement on the housing which is accessible from the outside by means of which the heater arrangement and the fan and/or ventilator equipment can be manually switched on. For this, one combined manual switch can be provided or even several separate manual switches as well, depending on a concrete, given or desired evaporation situation. In particular, the combination of one or, respectively, individual manual switches will be possible with a timer equipment of the control equipment, e.g. such that – upon activation of a manual heater switch for heating a specific heating block area or, respectively, a heater via the timer function – a fan and/or ventilator equipment, e.g. a ventilator, will be switched on for a specific, definable time.

In accordance with another preferred embodiment according to Claim 19, the wick end/heater area in the housing can be capsulated, especially to ensure that an air stream generated by the fan and/or the ventilator equipment will not directly impinge upon the heater arrangement but merely upon a wick end area. In the case of such wick arrangements where the wick end is incorporated more or less flush with the surface in the heater or, respectively, in the heating block, encapsulation or, respectively, screening can be such that – in the corresponding housing parts which effect the encapsulation – air slots will be provided through which the volatilizing substance can escape, starting from the wick end area into the area in which it impinges upon the air stream.

Especially advantageously, a mixing chamber can also be formed on the housing – as claimed with Claim 20.

Depending on the embodiment, the receptacle arrangement can be formed – as claimed with Claim 21 – by several separate receptacles which form the individual receiving chambers or also by a single receptacle which is formed of several chambers.

Moreover, it can be provided – as claimed with Claim 22 – that the housing is formed of several parts, of e.g. at least two housing parts.

Likewise, it can be provided that an electric plug is either directly arranged on the housing or coupled via a cable with the evaporation device.

Additional preferred embodiments are claimed in Claims 24 to 26.

In the following, the invention is explained in more detail by means of a drawing.

Presented are:

Fig. 1 a diagrammatic basic presentation of a first embodiment of an evaporation device according to the invention, in a side view,

Fig. 2 a diagrammatic front view of the evaporation device according to Fig. 1,

Fig. 3 a diagrammatic front view according to Fig. 2 with an alternative embodiment of the evaporation device, having two ventilators,

Fig. 4 a diagrammatic basic presentation of an embodiment of the evaporation device, alternative to Fig. 1, in a side view,

Fig. 5 a diagrammatic front view of the evaporation device according to Fig. 4,

Fig. 6 a diagrammatic front view according to Fig. 5 with an alternative embodiment of the evaporation device, having two ventilators,

Fig. 7 a diagrammatic front view of another alternative embodiment of an evaporation device with a separate heater for every wick end,

Fig. 8 a diagrammatic basic presentation of a plan view of a heater arrangement formed by one heating block, in accordance with the embodiments of Fig. 1 to 6,

Fig. 9 an alternative embodiment of a heater arrangement in accordance with Fig. 7 with two separate heaters,

Fig. 10 an alternative embodiment of a receptacle arrangement formed by a single receptacle with two receiving chambers, and

Fig. 11 an alternative embodiment of an evaporation device with a heater arrangement heating the air stream.

Fig. 1 shows diagrammatically a first embodiment of an evaporation device 1, advantageously having a multi-part housing 2 in which a receptacle arrangement 3 can be inserted in a generally known manner. As can be taken from the diagrammatic front view of Fig. 2, this receptacle arrangement 3 consists of a first receptacle 4 and a second receptacle 5 in which may have been incorporated, for example, different substances to be evaporated, e.g. two aromatics or two insecticides, but also one aromatic and one insecticide.

Alternatively to such a receptacle arrangement 3 with two separate receptacles 4, 5 forming the receiving chambers for the substances to be evaporated, a receptacle arrangement 6 in accordance with Fig. 10 may be provided as well, where one

single receptacle has a first receiving chamber 7 and a second receiving chamber 8 for the substances to be evaporated.

As can be further taken from Fig. 1 and 2 or 10, respectively, a wick 9 is inserted into each receptacle 4, 5 or, respectively, into each of the receiving chambers 7, 8, the wick protruding with one wick end 10 from the corresponding receptacle 4, 5 or, respectively, the corresponding receiving chamber 7, 8.

As is shown only in an extremely diagrammatic and basic manner in Fig. 1 and 2, assigned to the wick ends will be a heater arrangement 12 which – as can be taken from Fig. 8 – is formed by a single heating block 13 featuring two heating block areas 18 and 19 thermally isolated from each other by means of an air slot 20. In the first heating block area 18, a first wick recess 21 is formed to which is assigned, in turn, a first electrical resistance element 23 on this first heating block area 18. Correspondingly, on the opposite side of the air slot 20 on the second heating block area 19, a second wick recess 22 is provided to which is assigned a second electrical resistance element 24 on the second heating block area 19.

Heating block 13 is advantageously built up of a ceramic material with the two resistance elements 23, 24 being so-called film resistors which are incorporated in the corresponding recesses of heating block 13 and are there grouted in with a cement.

The two wick recesses 21, 22 are formed as passage holes here on heating block 13 through which – as can be taken diagrammatically from Fig. 1 and 2 – the corresponding wick ends 10 are being passed so that they more or less protrude from this heating block 13.

As can be further taken from Fig. 1, the wick end 10 protrudes with one wick end area 36 from the heating block 13. To prevent the air stream 33 from blowing against the heating block 13, this wick end/heater area 41 is preferably capsulated by means of a housing wall 43, i.e. a wick end / heater housing partial area 42 is being formed through which only one wick end area 36 of wick end 10 will protrude. Thus, heating block 13 is screened such from an air stream 33 of a ventilator 17 that this air stream 33 can only impinge upon the wick end area 36.

The ventilator 17 is, in turn, screened off or, respectively, capsulated, by means of at least one housing wall 38, with the housing wall 38 forming a nozzle area 40 in the

area of a ventilator / air stream passage opening 39, to achieve a well-targeted air stream 33 with a high air velocity when the ventilator 17 is switched on. In activated condition, the ventilator takes in ambient air via the air entry openings 46 and 47.

Heater arrangement 14 as well as ventilator 17 are coupled with a control equipment 11 which is here shown only in an extremely diagrammatic and basic manner, featuring furthermore a manual switching arrangement 29 with a manual heater switch 30, shown in Fig. 2, and a manual ventilator switch 31 shown in Fig. 1 and 2.

The two heating block areas 18, 19 can be controlled by means of the manual heater switch 30, depending on the switching position, and they are advantageously controllable such that – starting from an off-position in which none of the two heating block areas 18, 19 are heated – optionally one of the two heating block areas 18, 19 or also both heating block areas 18, 19 can be simultaneously heated.

To achieve, especially at the beginning of an evaporation, a particularly fast and effective distribution of the respectively desired substance or, respectively, substances to be evaporated, ventilator 17 can also be switched on via the manual ventilator switch 31 or, respectively, alternatively timer-controlled upon actuation of the manual heater switch 30, so that an air stream 33 will be generated which – in the near wick-end evaporation area 32 – impinges upon the evaporated substance 34 and entrains it in the type of a carrier gas to the air outlet areas 35 or, respectively, the ventilation slots on housing 2 so that they can escape into the environment.

In Fig. 2, a first variant of this evaporation device 1 is presented in a front view of the structure according to Fig. 1 wherein merely one ventilator 17 is provided for generating a well-targeted ventilator air stream 33. However, in accordance with another alternative embodiment – as presented in Fig. 3 – a ventilator arrangement with two ventilators 17 can also be provided, with one of the ventilators 17 each being assigned then to one of the two wick ends 10. In such a case, and as also shown in Fig. 3 in an only extremely diagrammatic and basic presentation, two ventilators 17 can also form two separate ventilator/ housing partial areas 37 by means of a corresponding design of the housing walls 38 in this area. With such an embodiment, the individual ventilators 17 can also be switched on in a well-targeted manner, e.g. such that – with an evaporation of the substance incorporated in the first receptacle 4 – only ventilator 17 on the left of the picture plane of Fig. 3 will be switched on via the manual ventilator switch 31, preferably only for a specifically

desired, so-called boost or, respectively, blast time in which a particularly fast and effective distribution of the substance to be evaporated into the environment will be desired. To prevent, for example, a habituation effect, the other substance incorporated in the second receptacle 5 can then be additionally or even alone evaporated for a specified period of time – by means of the manual switches 30, 31 or, respectively, also alternatively timer-controlled as a function of a manual switch actuation – here, the second ventilator on the right of the picture plane of Fig. 6 then being correspondingly switched on at least intermittently.

Figures 4 to 6 show an alternative embodiment of the evaporation device 1 which differs from those of Fig. 1 to 3 merely by the wick end / heater area 41 being capsulated by means of the housing wall 43 such that the wick end 10 is arranged below this housing wall 43 in the area of the ventilation slots 44 there provided. Via these ventilation slots 44, the evaporated substance 34 can escape into a mixing chamber 45 in which the air stream 33 generated by the ventilator or, respectively, the ventilators 17 will impinge upon it and entrain it towards the ventilation slots 35.

Fig. 7 shows another alternative embodiment of the evaporation device 1 which – in contrast to the embodiments of Fig. 1 to 6 described before – provides for an alternative heater arrangement 14, featuring a first heater 15 and a second heater 16, of which one each respectively is assigned to one wick end 10. The structure of these heaters 15 and 16 is shown, by way of example, in Fig. 9 which clearly shows that each heater has a wick recess 25, 26, with each of these wick recesses being assigned an electrical resistance element 27, 28.

The resistance elements 23, 24 of Fig. 8, as well as the resistance elements of Fig. 9 are here presented merely in an exemplary fashion as film resistors. Of course, other electrical resistance elements can also be used, such as e.g. PTC resistance elements, instead of the resistance elements here provided.

With the evaporation devices 1, beforehand described in their structure, an evaporation can be particularly advantageously performed wherein an aromatic is incorporated in one of the two receptacles 4, 5 or, respectively, in one of the two receiving chambers 7, 8, and an insecticide being incorporated in the respectively other chamber. Via a timer equipment provided in the control equipment 11, evaporation can then take place – e. g. in connection with a programmable microprocessor or, respectively, in connection with a manual switching arrangement as well – such that the aromatic or, respectively, the perfume will be evaporated

during the day whereas at a specifiable time, it will be switched over to overnight operation for evaporation of the insecticide. Such nighttime evaporation of insecticides can be performed until – again after a correspondingly specifiable time span – it can be switched over again to the evaporation of the aromatic via the timer equipment included in the control equipment. For example, such programming can be performed that the currently not evaporated substance will also be additionally evaporated at least at specific times, e.g. periodically. Due to the manual switching – or also due to the controlled switching via the timer equipment of the control equipment – of the ventilator or, respectively, the ventilators, it can be achieved in a simple manner that the required and desired concentration of aromatic or, respectively, insecticide will be reached in a fast and simple manner after the switch-over.

However, in accordance with another particularly advantageous process design, e.g. two different insecticides can also be incorporated in the two receptacles 4, 5 or, respectively, in the two receiving chambers 7, 8 which are designed for different types of insects, e.g. for mosquitoes on the one hand, and e.g. for flies on the other hand. Due to e.g. the timer-controlled switching-on of a ventilator 17 or, respectively, due to the timer-controlled switching-on as a function of a manual switch actuation, it is now possible to provide – in a considerably shorter period of time after switching over from one to the other substance – a required high concentration of such insecticides which require a higher concentration to develop their effect, so that this evaporation device can prevent the undesirable continuous release of the insecticide over a long period of time.

Fig. 11 finally shows another variant of an evaporation device 1 in accordance with the invention which is essentially similar in structure to the aforementioned ones, however, with the essential difference that the heater arrangement here features a heating element 49 which is drawn only in an extremely diagrammatic and exemplary manner in the presentation of Fig. 11. This heating element 49 is arranged such in the capsulated ventilator/housing partial area 37 that the air inlet stream taken in by ventilator 17 and diagrammatically presented by arrows 46, 47 will be heated so that a warmed-up or, respectively, heated air stream 33 is generated which leaves the ventilator/housing partial area 37 via the nozzle area 40 and which – in the mixing chamber 45 – will advantageously impinge upon the wick end or, respectively, the wick ends arranged in the flow area to evaporate the corresponding substance away from the wick end as it is diagrammatically presented in Fig. 11. In particular, such a structure is also advantageous in

combination with an evaporation device in which merely one single receptacle is used for one substance to be evaporated. Especially in combination with two receiving chambers for different substances, it is advantageous to assign to each individual wick end 10 a separate ventilator 17 to ensure that the desired substance will also be evaporated when the ventilator 17 is actuated. Here again it is possible to completely switch off the ventilator 17, e.g. manually or timer-controlled so that the evaporation will be performed without the addition of heat. Because – as shown in Fig. 11 – there is no heater arrangement provided in this case in the area of the wick end 10. Alternatively, which however is not presented here, a heater arrangement can be provided for heating the wick, however, also in addition to the heating element 49 heating the air stream. This results in a particularly advantageous and effective and thus also fast evaporation of the substance to be evaporated or the substances to be evaporated, respectively.